APPENDIX K

Wind Erosion Modeling

12/04/2008 Black Rock Geothermal Site Worley Parsons

Summary of Wind Erosion Calculation Assumptions:

The project site is located directly to the west of the Salton Sea in Imperial County California. Existing conditions of the site consist of cultivated farm land planted with Alfalfa. The two major types of soil on the site are Holtville Silty Clay and Glenbar Silty Clay Loam. They consist of 78.3 acres and 123.3 acres respectively.

The program used to calculate the total wind erosion soil loss was WEPS (Wind Erosion Prediction System) provided by the USDA Natural Resources Conservation Service. This program calculates the total soil loss from wind erosion using climate, wind, soil and site management data.

For the post construction conditions only 63.1% of the sites soil will be left in the existing condition. A berm around the whole site will be from 0-4 feet in height to prevent the 100 year flood from inundating the site. The berm will help in reducing the soil loss due to wind so this factor was entered into the parameters for calculating the soil loss. The area used to calculate the post construction soil losses was 63.1% of the total site area due to that being the only areas that will have soil exposed to the wind. The remaining portion of the site will be covered in Geothermal power plant equipment and concrete mat foundations.

The results from the WEPS program for pre-construction conditions for wind erosion soil loss are as follows. For the Holtville Silty Clay soil the total is 509 tons/year and for the Glenbar Silty Clay Loam soil it is 534 tons/year. Pre-construction conditions consisted of bare soil and no berm around the entire site that will decrease wind erosion.

The results from the WEPS program for total wind erosion soil loss for post-construction conditions of the entire power block was 148 tons/year for the Holtville Silty Clay soil type and 172 tons/year for the Glenbar Silty Clay Loam. These results and the data parameters are summarized in the attached Run Summary reports created by the WEPS program.



Run Date:

Thursday 04 December 2008 04:15 PM

Client Name:

Black Rock (Pre-Construction)

Farm No:

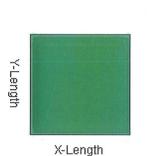
Tract No: ---

Field No: ---

Run Location: C:\Documents and Settings\Jonas.Dahlgren\My Documents\WEPS

Management: SD BareSoil-TEST.man Glenbar_106_85_CL.ifc

Simulation & Site Information



X-Length: Y-Length: 208.66 ft

208.66 ft

Area:

4.35 ft²

Elevation: -118.11 ft

Orientation: 0.00 ? Mode:

DATES

State:

California

County:

Imperial

Location:

33.03? N, 115.29? W

Cligen:

BRAWLEY

Windgen:

IMPERIAL

Erosion						
		Gross Loss	Net Soil Loss From Field (tn/ac)			
Period	Crop	tn/ac	Total	Creep/Salt.	Suspension	PM10
Rot. year: 1		4.33	4.33	3.488	0.845	0.035
Ave. Annual		4.33	4.33	3.488	0.845	0.035

SCI Summary

Notes

Soil Conditioning Index

-0.1410

Wind Erosion Soil Loss

4.3364 tn/ac

Energy Calculator

0.0000 gal diesel/ac **Water Erosion Soil Loss**

0.0000 tn/ac

Average Annual STIR

0.0000

SCI Subfactors

OM	FO	ER
-1.0000	1.0000	-0.7072

Rotation Sti	r Energy			
				Energy
Date	Operation	Crop	Stir	gal diesel/ac
Jan 01, 01	Begin weed growth	no crop	0.00	0.00



Run Date: Thursday 04 December 2008 04:15 PM
Client Name: Black Rock (Pre - construction)

Farm No: --- Tract No: --- Field No: ---

Run Location: C:\Documents and Settings\Jonas.Dahlgren\My Documents\WEPS

Management: SD_BareSoil-TEST.man **Soil:** Holtville_110_85_SIC.ifc

Simulation & Site Information



X-Length: 208.66 ft **Y-Length:** 208.66 ft

Area: 4.35 ft^2 **Elevation:** -118.11 ft

Orientation: 0.00 ?

Mode: DATES

State: California County: Imperial

Location: 33.03? N, 115.29? W

Cligen: BRAWLEY Windgen: IMPERIAL

Erosion						
		Gross Loss	Net Soil Loss From Field (tn/ac)			
Period	Crop	tn/ac	Total	Creep/Salt.	Suspension	PM10
Rot. year: 1		6.51	6.51	4.109	2.404	0.079
Ave. Annual		6.51	6.51	4.109	2.404	0.079

SCI Summary					
Soil Conditioning Index	-0.3130		Wind Erosion Soil Loss 6.5169 tn/ac		
Energy Calculator	0.0000	gal diesel/ac	Water Erosion Soil Loss 0.0000 tn/ac		
Average Annual STIR	0.0000		SCI Subfactors		
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			-1.0000 1.0000 -1.5658		

Rotation Stir Energy						
			Energy			
Date	Operation	Crop Stir	gal diesel/ac			
Jan 01, 01	Begin weed growth	no crop 0.00	0.00			

Notes



Run Date:

Thursday 04 December 2008 11:36 AM

Client Name:

Black Rock (Post - Construction)

Farm No:

Tract No: ---

Field No: ---

Run Location: C:\Documents and Settings\Jonas.Dahlgren\My Documents\WEPS

Management: SD BareSoil-TEST.man Soil:

Holtville 110 85 SIC.ifc

Simulation & Site Information



X-Length:

165.68 ft

Y-Length:

165.68 ft

Area:

2.75 ft^2

Elevation: -118.11 ft

Orientation: 0.00 ? Mode:

DATES

State:

California

County:

Imperial

Location:

33.03? N, 115.29? W

Cligen:

BRAWLEY

Windgen:

IMPERIAL

Erosion						
		Gross Loss	Net Soil Loss From Field (tn/ac)			
Period	Crop	tn/ac	Total	Creep/Salt.	Suspension	PM10
Rot. year: 1		2.39	1.89	1.202	0.690	0.024
Ave. Annual		2.39	1.89	1.202	0.690	0.024

Barriers				
Location	Туре	Height ft	Width ft	Porosity fraction
North	<mod> Fence, solid</mod>	2.00	18.01	0.05
East	<mod> Fence, solid</mod>	2.00	18.01	0.05
South	<mod> Fence, solid</mod>	2.00	18.01	0.05
West	<mod> Fence, solid</mod>	2.00	18.01	0.05

SCI Summary

Energy Calculator

Soil Conditioning Index

0.0510

0.0000

gal diesel/ac

Wind Erosion Soil Loss

1.8928 tn/ac

Water Erosion Soil Loss

0.0000 tn/ac

Average Annual STIR 0.0000

Operation

SCI Subfactors

OM FO ER -1.0000 1.0000 0.2548

Rotation Stir Energy

Date

Energy

Crop

Stir

gal diesel/ac



Rotation Stir Energy					
			Energy		
Date	Operation	Crop Stir	gal diesel/ac		
Jan 01, 01	Begin weed growth	no crop 0.00	0.00		

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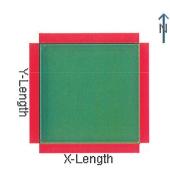
Run Date: Thursday 04 December 2008 11:36 AM Client Name: Black Rock(Post-construction)

Farm No: --- Tract No: --- Field No: ---

Run Location: C:\Documents and Settings\Jonas.Dahlgren\My Documents\WEPS

Management: SD_BareSoil-TEST.man Soil: Glenbar_106_85_CL.ifc

Simulation & Site Information



X-Length: 165.68 ft **Y-Length:** 165.68 ft

Area: 2.75 ft^2 **Elevation:** -118.11 ft

Orientation: 0.00 ?

Mode: DATES

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State: California
County: Imperial

Location: 33.03? N, 115.29? W

Cligen: BRAWLEY Windgen: IMPERIAL

Erosion							
Gross Loss				Net Soil Loss From Field (tn/ac)			
Period	Crop	tn/ac	Total	Creep/Salt.	Suspension	PM10	
Rot. year: 1		1.93	1.40	1.126	0.274	0.011	
Ave. Annual		1.93	1.40	1.126	0.274	0.011	

Barriers				
Location	Туре	Height ft	Width ft	Porosity fraction
North	<mod> Fence, solid</mod>	2.00	18.01	0.05
East	<mod> Fence, solid</mod>	2.00	18.01	0.05
South	<mod> Fence, solid</mod>	2.00	18.01	0.05
West	<mod> Fence, solid</mod>	2.00	18.01	0.05

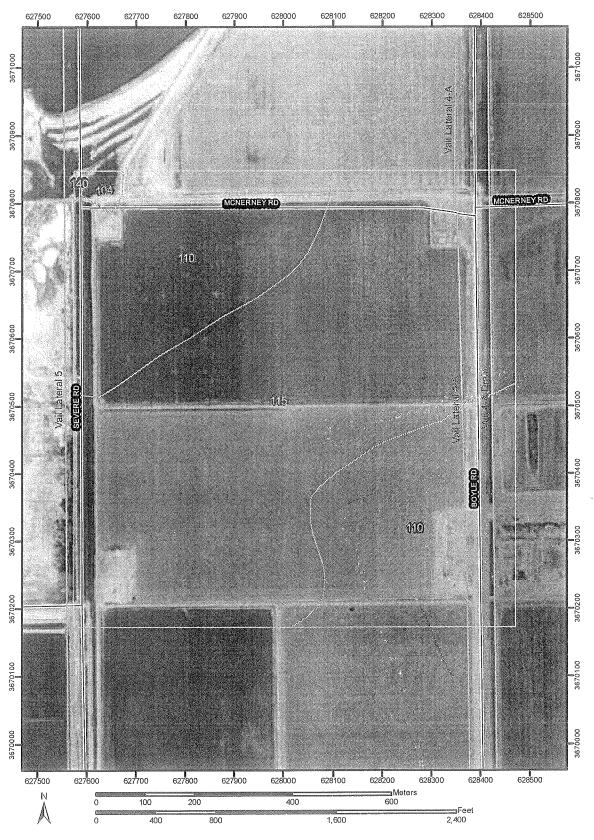
SCI Summary			
Soil Conditioning Index	0.0900		Wind Erosion Soil Loss 1.4012 tn/ac
Energy Calculator	0.0000	gal diesel/ac	Water Erosion Soil Loss 0.0000 tn/ac
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Rotation	Stir Energy			
				Energy
Date	Operation	Crop	Stir	gal diesel/ac



Rotation Stir	Energy		
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Date	Operation	Crop Stir	gal diesel/ac
Jan 01, 01	Begin weed growth	no crop 0.00	0.00

Notes			



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Stony Spot Spoil Area

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MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov Coordinate System: UTM Zone 11N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Imperial County, California, Imperial Valley

Date(s) aerial images were photographed: 9/26/1992 Survey Area Data: Version 5, Jul 25, 2008

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident. The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
104	FLUVAQUENTS, SALINE	1.3	0.6%
110	HOLTVILLE SILTY CLAY, WET	78.3	38.5%
115	IMPERIAL-GLENBAR SILTY CLAY LOAMS, WET, 0 TO 2 PERCENT SLOPES	123.3	60.7%
140	TORRIORTHENTS-ROCK OUTCROP COMPLEX, 5 TO 60 PERCENT SLO PES	0.3	0.1%